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IS 12884 : 1990

Indian Standard

AUTOMOTIVE VEHICLES — BRAKING SYSTEMS, RUBBER BOOTS FOR BRAKE WHEEL CYLINDERS — PERFORMANCE REQUIREMENTS

भारतीय मानक

स्वचल वाहन — ब्रेक प्रणाली, व्हील सिलिंडरों के लिए रबड़ के बूट — कार्यकारिता अपेक्षाएँ

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MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

July 1990

Price Group 3

Automotive Braking Systems Sectional Committee, TED 4

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards on 25 January 1990, after the draft finalized by the Automotive Braking Systems Sectional Committee had been approved by the Transport Engineering Division Council.

Rubber boot is one of the critical components of the hydraulic brake systems. In the preparation of this Indian Standard considerable assistance has been derived from the following:

SAE J 1604	Rubber boots for drum type hydraulic brake wheel cylinders
JIS D 2608	Rubber boots of hydraulic brake wheel cylinders for automobiles, issued by Japanese Industrial Standards Committee

The test method for ozone test set up has followed ASTM D 1149-1986 'Rubber deterioration-surface ozone cracking in chamber'.

AMENDMENT NO. 3 JUNE 2006
TO
IS 12884 : 1990 AUTOMOTIVE VEHICLES — BRAKING SYSTEMS, RUBBER BOOTS FOR BRAKE WHEEL CYLINDERS — PERFORMANCE REQUIREMENTS

(*Page* 1, *clause* 2) — Substitute the following for the existing and replace the referred IS No wherever appearing in the text with the following

2 REFERENCE

The following standard contains provisions, which through reference in this text, constitute provisions of this standard At the time of publication the editions indicated were valid All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below

IS No	*Title*
8654 2001	Automotive hydraulic brake fluid, heavy duty — Specification (*second revision*)

(*Page* 1, *clause* 4) — Insert following new clauses after 4.1

'5 MARKING

5.1 Each rubber boot shall be marked with the following

a) Manufacturer's name, his initials or trade-mark,
b) Identification of mould (cavity number)

5.1.1 Date of packing or Control Unit No

5.2 BIS Standard Mark

Rubber Boots may also be marked with the Standard Mark

5.2.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 1986 and the Rules and Regulations made thereunder The details of conditions under which the licence for the use of Standard Mark may be granted to the manufacturers or producers may be obtained from the Bureau of Indian Standards '

(TED 4)

Reprography Unit, BIS, New Delhi, India

Automotive Braking Systems Sectional Committee, TED 4

FOREWORD

This Indian Standard was adopte
draft finalized by the Automotive
Transport Engineering Division (

Rubber boot is one of the critical
this Indian Standard considerabl

SAE J 1604 Rubber boots

JIS D 2608 Rubber boots
Japanese Indus

The test method for ozone test s
surface ozone cracking in chamb

AMENDMENT NO. 2 NOVEMBER 2003
TO
IS 12884 : 1990 AUTOMOTIVE VEHICLES — BRAKING SYSTEMS, RUBBER BOOTS FOR BRAKE WHEEL CYLINDERS —PERFORMANCE REQUIREMENTS

(*Page* 2, *clause* **A-3.1**) — Substitute

$$`V = \left\{ \frac{(W_3 - W_4) - (W_1 - W_2)}{(W_1 - W_2)} \right\} \times 100'$$

for

$$`V = \frac{(W_3 - W_4) - (W_1 - W_2) \times 100}{(W_1 - W_2)}'$$

(*Page* 3, *clause* **D-2.1**) — Substitute '– 40 to – 43°C' *for* '– 40 to 43°C'.

(TED 4)

Reprography Unit, BIS, New Delhi, India

AMENDMENT NO. 1 APRIL 1995
TO
IS 12884 : 1990 AUTOMOTIVE VEHICLES — BRAKING SYSTEMS, RUBBER BOOTS FOR BRAKE WHEEL CYLINDERS — PERFORMANCE REQUIREMENTS

(*Page* 3, *Fig.* 2, *matter at left side top of the figure*) — Substitute the following for the existing matter:

'RETRACTOR SPRING SHALL REQUIRE NOT MORE THAN 350 kPa TO MAKE A COMPLETE STROKE AT ROOM TEMPERATURE'

(TED 4)

Reprography Unit, BIS, New Delhi, India

Indian Standard

AUTOMOTIVE VEHICLES — BRAKING SYSTEMS, RUBBER BOOTS FOR BRAKE WHEEL CYLINDERS — PERFORMANCE REQUIREMENTS

1 SCOPE

1.1 This Indian Standard specifies the performance requirements and test methods for rubber boots at the end of wheel cylinders (used in drum brakes) to prevent the entrance of impurities like dirt and moisture.

1.2 The rubber boots are intended for operation in a temperature range of −40 to 120±2°C.

2 REFERENCE

2.1 The following Indian Standard is a necessary adjunct to this standard:

IS No.	*Title*
8654 : 1986	Automotive hydraulic brake fluid, heavy duty (*first revision*)

3 GENERAL REQUIREMENTS

3.1 There shall be no cracks, blisters, pin-holes, swelling, embedded foreign material on the boot surface or any other physical defects.

4 PERFORMANCE REQUIREMENTS

4.1 The performance of the boots when tested as per Annex A to G shall comply with the requirements as follows:

Sl No.	Description	Performance Requirements	Test Method (Reference)
a)	Resistance to fluid at elevated temperature	Change in volume rate −10 to +15 percent Change in hardness −10 to +10 IRHD	Annex A
b)	Heat stroking test	After stroking test, the boot shall be free of flex, cracks which extend through the wall thickness and shall fit tightly around the cylinder and push rod/piston	Annex B
c)	Low temperature stroking test	During stroking, the boot shall not crack or separate from its assembled position on the cylinder or become loose on the push rod	Annex C
d)	Low temperature — bend test	The boot surface shall reveal no crack and shall be capable of returning to original shape in less than one minute	Annex D
e)	Tension set test	The boot shall show not more than 75 percent tension set	Annex E
f)	Heat resistance test — Static	After the heat resistance test the boot shall conform to the following: a) No cracking shall occur when flexed to service conditions b) Change in hardness −5 to +10 points IRHD	Annex F
g)	Ozone resistance test	At the end of 70 hours exposure period, when examined under 2X magnification, the surface of the specimen shall show no evidence of cracking, rupture or other deterioration	Annex G

ANNEX A

[*Clause* 4.1 (a)]

RESISTANCE TO FLUIDS AT ELEVATED TEMPERATURE

A-1 TEST SPECIMEN

A-1.1 A strip of 3 to 5 g from each boot for testing shall be taken. Two specimens to be used.

A-2 TEST PROCEDURE

A-2.1 Determine and record initial volume of each seal by finding out the difference between the weight in air and weight in water.

A-2.2 Determine and record initial IRHD hardness of the test seals using a microtester.

A-2.3 Test specimens shall be completely immersed in 75 cc of brake fluid conforming to IS 8654 : 1986 or any higher grade as recommended by the vehicle manufacturer in a glass jar and tightly capped. The jar shall be placed in an oven at 120 ± 2°C for a period of 70 ± 2 hours.

At the end of the heating period, allow the test specimens to cool in the glass jar to ambient conditions for 60 to 90 minutes and then rinsed with isopropyl alcohol or ethyl alcohol and wipe dry. Specimen's shall not remain in the alcohol for more than thirty seconds. Determine and record the fluid volume and hardness (IRHD) of each specimen. Examine the specimens for disintegration as evidenced by blisters or sloughing.

A-3 CALCULATION

A-3.1 The change in volume 'V' in percentage is obtained from the equation:

$$V = \frac{(W_3 - W_4) - (W_1 - W_2) \times 100}{(W_1 - W_2)}$$

where

V = change in volume, percent,

W_1 = mass in air before dipping, g,

W_2 = mass in water before dipping, g,

W_3 = mass in air after dipping, g, and

W_4 = mass in water after dipping, g.

ANNEX B

[*Clause* 4.1 (b)]

HEAT STROKING TEST

B-1 TEST SPECIMENS

B-1.1 Two boots with corresponding wheel cylinder shall be taken as test specimens.

B-2 TEST PROCEDURE

B-2.1 Assemble the wheel cylinder and boots taking the normal precautions and then mount the cylinder into the actuator assembly, operating at 1 000 strokes/hour with a stroke length of 4·8 ± 0·5 mm. A typical set up for actuation is shown in Fig. 1.

Place the cylinder assembly with the test boots in the oven and actuate for 22 ± 1 hour at 120 ± 2°C. The brake fluid used shall conform to IS 8654 : 1986.

After the actuation of the assembly it shall be removed from oven, allowed to cool to room temperature and the boots examined for flex, cracks and general appearance.

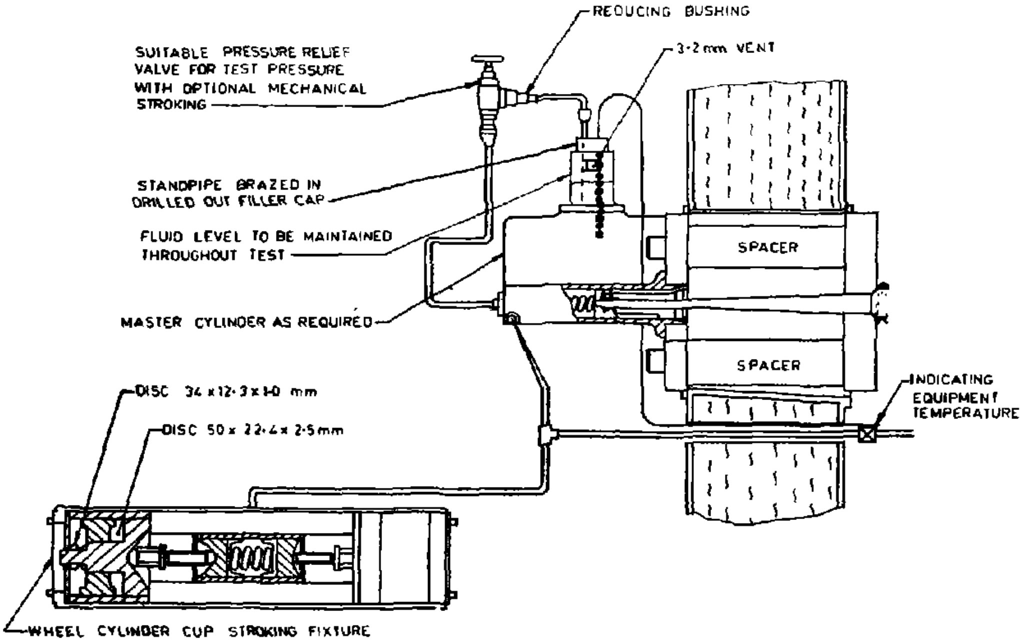
REDUCING BUSHING
3·2 mm VENT
SUITABLE PRESSURE RELIEF VALVE FOR TEST PRESSURE WITH OPTIONAL MECHANICAL STROKING
STANDPIPE BRAZED IN DRILLED OUT FILLER CAP
FLUID LEVEL TO BE MAINTAINED THROUGHOUT TEST
SPACER
SPACER
MASTER CYLINDER AS REQUIRED
INDICATING EQUIPMENT TEMPERATURE
DISC 34 x 12·3 x 1·0 mm
DISC 50 x 22·4 x 2·5 mm
WHEEL CYLINDER CUP STROKING FIXTURE

FIG. 1 TYPICAL ACTUATOR FOR HEAT STROKING TEST

ANNEX C

[*Clause* 4.1 (c)]

LOW TEMPERATURE STROKING TEST

C-1 TEST SPECIMEN

C-1.1 Two boots with corresponding wheel cylinder shall be taken as test specimen.

C-2 TEST PROCEDURE

C-2.1 Assemble the wheel cylinder and boots taking the normal precautions and mount the same into the actuator assembly. A typical actuator is shown in Fig. 2.

Place the wheel cylinder assembly with the test boots in a cold chamber which is sufficient to contain them and so arranged to permit the operator to check and operate it without removal from the chamber, thus exposing the specimen to a *temperature of* −40 *to* −43°C *for* 70±2 *hours.*

After 70±2 hours of low temperature exposure, stroke the boots with the stroking apparatus for 6 strokes, 30 seconds apart, without removal from the chamber. The brake fluid used shall be as per IS 8654 : 1986.

After the test, the wheel cylinder assembly is taken from the cold chamber and checked. The boot shall not reveal any crack in the assembled position of the cylinder or become loose on the push rod.

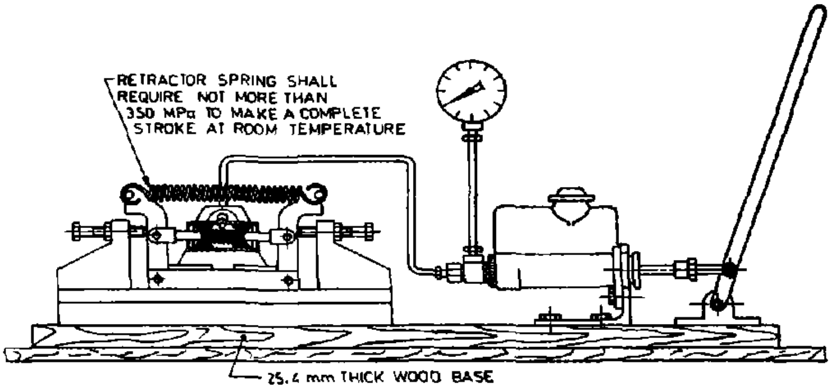
RETRACTOR SPRING SHALL REQUIRE NOT MORE THAN 350 MPa TO MAKE A COMPLETE STROKE AT ROOM TEMPERATURE
25.4 mm THICK WOOD BASE

FIG. 2 LOW TEMPERATURE LEAKAGE TEST APPARATUS

ANNEX D

[*Clause* 4.1 (d)]

LOW TEMPERATURE — BEND TEST

D-1 TEST SPECIMEN

D-1.1 One boot shall be taken as test specimen.

D-2 TEST PROCEDURE

D-2.1 Place the boot in a cold chamber at −40 to 43°C for 70±2 hours.

At the end of the test, bend the boot between thumb and finger inside the chamber and immediately release. Check the condition when it returns to its original shape. Returning the boot to room temperature, check for cracks. Use gloves for bending to avoid conduction of body heat.

ANNEX E

[*Clause* 4.1 (e)]

TENSION SET TEST

E-1 TEST SPECIMEN

E-1.1 Three boots are taken as test specimen.

E-2 TEST PROCEDURE

E-2.1 A mandrel is made, to suit the sealing end attached to wheel cylinder or to the actuating push rod/piston, such that the diameter is 115 percent of the moulded dia of the chosen boot end. This means that when the test boot is mounted on to the mandrel, it will expand the chosen boot end by 15 percent. The moulded diameter shall be calculated from the average of two measurements made at right angles to each other. The mandrel shall be provided with a smooth lead-in chamfer to prevent cutting of the rubber and shall itself have a polished machine finish (0·40 µm in AA maximum).

Measure the inside diameter of the ends of 3 specimen boots to nearest 0·02 mm. Measure at two positions at right angles to each other and take the mean value.

Assemble the test boots on the stretch mandrels. Place assemblies in the oven and heat for 70±2 hours at 120±2°C.

At the end of the heat exposure, remove the assemblies and cool at room temperature. Take the boots off the mandrel and allow to recover for 1 hour. Again measure the diameter and record.

E-3 CALCULATIONS

E-3.1 *Tension set* is calculated as a percentage of the original stretch deflection as per the following:

$$\text{Tension set} = \frac{(D_2 - D_1)}{(D_3 - D_1)} \times 100$$

where

D_1 = dia before test, mm,

D_2 = dia after the test, mm; and

D_3 = mandrel dia, mm.

NOTE — Minimum 3 specimens shall be tested in the above manner.

ANNEX F

[*Clause* 4.1 (f)]

HEAT RESISTANCE TEST — STATIC

F-1 TEST SPECIMEN

F-1.1 Two boots shall be taken as test specimen.

F-2 TEST PROCEDURE

F-2.1 Determine the initial hardness using the Shore harness tester. Suspend the test specimens in an oven for 22±1 hour at 120±2°C.

At the end of the heat exposure remove them from the oven, allow to cool to room temperature and then check the hardness and flexibility.

ANNEX G

[*Clause* 4.1 (g)]

OZONE RESISTANCE TEST

G-1 TEST SPECIMEN

G-1.1 Two boots shall be taken as test specimen.

G-2 TEST PROCEDURE

G-2.1 For conducting tests, an ozone chamber as shown in Fig. 3 or 4 capable of maintaining an ozone concentration of 50±5 ppm is recommended. A stretching mandrel as given in Annex E is also made available for carrying out the test.

Assemble the boots on the stretching mandrel and allow to rest for 22±2 hours at room temperature, then subject the boots installed on the mandrels to an ozone concentration of 50±5 ppm by volume at 40±2°C for 70±2 hours.

At the end of the exposure, the boot surface shall be free from cracks.

NOTE — Figures 3 and 4 provide typical arrangement for ozone cracking chamber. However, an acceptable ozone chamber is one that has sufficient air-ozone throughput rate, internal circulation and volume. The volume of the chamber shall at least be 0·11 to 0·14 m³. It is also recommended that the generating source is kept outside the chamber with filtration of foreign matter from the strainer. The recommended partial pressure of ozone shall be approximately 50 mPa. The air-ozone velocity can be 0·6 m/s. The normal source of ozone is the mercury vapour lamp.

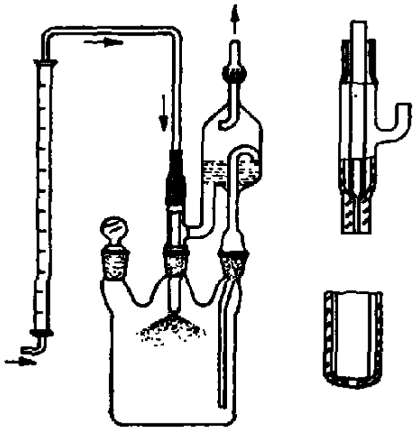

FIG. 3 OZONE ABSORBING DEVICE (TYPICAL) (SPRAY-JET)

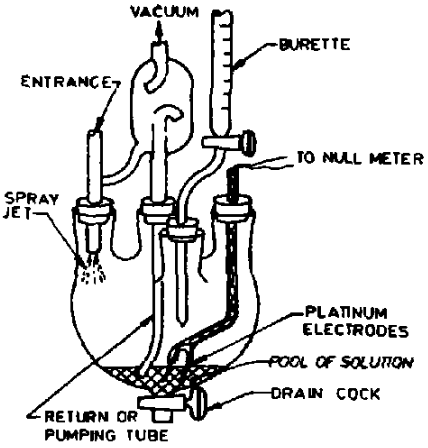

FIG. 4 MODIFIED SPRAY-JET APPARATUS

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